

~~wherein said vacuum loader has~~

PAW 12/17/01 (17) a transfer chamber connected to said double lock chambers via the another gate valve;

PAW 12/17/01 (17) a conveyor structure; and

PAW 12/17/01 (17) plural vacuum processing chambers,

wherein said loader has a transfer device

/ transferring selectively substrates to be processed from said loader to one of said double lock chambers,

wherein said vacuum loader has said conveyor structure which transfers substrates to be processed, from said one of the double lock chambers to at least one of said plural vacuum processing chambers, via said transfer chamber;


wherein each of said plural vacuum processing chambers has a substrate table to maintain a surface of a substrate, treated in the at least one of the plural vacuum processing chambers, horizontal during a vacuum processing,

wherein said conveyor structure in said vacuum loader transfers processed substrates from said at least one of said plural vacuum processing chambers to one of said double lock chambers, via said transfer chamber, and

wherein said transfer device in said loader returns said substrates from one of the double lock chambers to their original positions in the cassette in which said substrates are stored prior to processing, surfaces of the substrates which have been processed being kept horizontal when said transfer device returns said substrates.

28. The conveyor system according to claim 27, wherein

said substrates are transferred between said either one of the double lock chambers and the at least one of said plural vacuum processing chambers by said conveyor structure, said conveyor structure being a single conveyor located in said transfer chamber.

 1. Sub C2  
~~29. The conveyor system according to claim 27, wherein, in transferring said substrates between said one of the double lock chambers and the at least one of said plural vacuum processing chambers, said substrates are transferred via only said transfer chamber of said vacuum loader, and gate valves therefor.~~

30. The conveyor system according to claim 27, wherein said substrates are semiconductor wafers.

31. The conveyor system according to claim 27, wherein substrates to be processed are transferred one by one from said one of the lock chambers to said at least one of said plural vacuum processing chambers, via the transfer chamber;

wherein the substrate are processed one by one in each of the plural vacuum processing chambers; and

wherein processed substrates are transferred one by one from the at least one of the plural vacuum processing chambers to one of said double lock chambers, via said transfer chamber.

32. The conveyor system according to claim 27, wherein

said substrates to be processed are transferred directly from said loader to said one of the double lock chambers.

Sub  
C3  
33. ~~A conveyor system used for transferring substrates~~  
to be processed to vacuum processing chambers, comprising:

1  
a conveyor for transferring selectively said substrates to be processed in said vacuum processing chambers from a loader to one of double lock chambers,

10  
a vacuum providing device in said one of the double lock chambers, after substrates to be processed have been transferred thereto; and

another conveyor, for transferring the substrates from said one of the double lock chambers to a vacuum loader, said vacuum loader loading said substrates into said vacuum processing chambers, said vacuum loader having gate valves for introducing substrates into said vacuum processing chambers and also having a transfer chamber and a conveyor structure, and

said conveyor in said loader returns said substrates from one of the double lock chambers to their original positions in the cassette in which said substrates are stored prior to processing, surfaces of the substrates which have been processed being kept horizontal when the conveyor returns ~~said substrates.~~

34. The conveyor system according to claim 33, wherein the substrates are semiconductor wafers.

35. The conveyor system according to claim 33, wherein said conveyor structure is a single conveyor, which transfers said substrates, one by one, between said one of the double lock chambers and said vacuum processing chambers.

36. The conveyor system according to claim 33, wherein said substrates are transferred one by one between said one of said double lock chambers and said vacuum processing chambers.

37. The conveyor system according to claim 33, wherein said substrates to be processed are transferred directly from said atmospheric loader to said one of the double lock chambers.

Sub  
C.4  
38. ~~An apparatus for transferring cassettes in operating~~  
a vacuum processing apparatus, the vacuum processing apparatus including:

a loader;


a vacuum loader; and

double lock chambers for connecting said loader and said vacuum loader,

wherein said loader includes a cassette mount unit located outside of said double lock chambers,

said cassette mount unit has a cassette positioning plane which is a substantially horizontal plane in which all cassettes, containing samples to be processed, are positioned in a row in front of a front wall of said double lock chambers, and

~~said cassette positioning plane is oriented such~~  
that a cassette is placed on and removed from said cassette  
positioning plane so as to maintain the surface of a sample to  
be processed substantially horizontal when the cassette  
containing the sample is on the cassette positioning plane,

 wherein the sample is transferred by a transfer  
device in said loader from said loader to one lock chamber of  
the double lock chambers, while maintaining the surface of the  
sample to be processed substantially horizontal, and

wherein said transfer device returns said samples  
from one of the double lock chambers to their original  
positions in said cassette in which said samples are stored  
prior to processing, surfaces of the samples which have been  
processed being kept horizontal in returning the samples to  
~~their original positions.~~

39. An apparatus for transferring cassettes in operating  
a vacuum processing apparatus, the vacuum processing apparatus  
including:

a loader;


a vacuum loader; and

double lock chambers for connecting said loader and  
said vacuum loader,

wherein said loader includes a cassette mount unit  
located outside of said double lock chambers,

said cassette mount unit has a cassette positioning  
plane which is a substantially horizontal plane in which all  
cassettes, containing samples to be processed, are positioned

in a row in front of a front wall of said lock chambers, and  
said cassette positioning plane is oriented such  
that a cassette is placed on and removed from said cassette  
positioning plane so as to maintain a surface of a sample to  
be processed substantially horizontal when the cassette  
containing the sample is on the cassette positioning plane;  
and

 an automatic cassette loader for loading cassettes  
on said cassette mount unit so as to maintain the sample  
surface to be processed substantially horizontal,

wherein the cassette is removed from said cassette  
positioning plane of said cassette mount unit by said  
automatic cassette loader, in accordance with data sent from a  
host control apparatus, while maintaining the sample surface  
substantially horizontal, and said vacuum processing apparatus  
automatically executes a sample processing, based on  
processing data, and

wherein a transfer device in said loader returns the  
samples from one of the double lock chambers to their original  
positions in said cassette in which said samples are stored  
prior to processing thereof, the sample surface being kept  
horizontal when the transfer device returns the samples.

40. An apparatus for vacuum processing a substrate by  
using plural vacuum processing chambers, comprising:

a transfer conveyor for carrying in the substrate  
into one vacuum processing chamber of said plural vacuum  
processing chambers, via one lock chamber selected from double

lock chambers,

said transfer conveyor carrying out the substrate processed in said vacuum processing chamber via another lock chamber of the double lock chambers, and

said transfer conveyor returns the substrate from said another lock chamber of the double lock chambers to its original position in said cassette in which said substrate is stored prior to processing thereof, a surface of the substrate which has been processed being kept horizontal when the transfer conveyor returns the substrate.

41. The apparatus according to claim 40, wherein carrying in and carrying out of said substrate are performed sequentially.

42. The apparatus according to claim 40, wherein at least one of dry etching, chemical vapor deposition and sputtering is performed in said plural vacuum processing chambers.


43. An apparatus for vacuum processing a substrate by using plural vacuum processing chambers, such that the substrates are processed one by one, comprising:

a transfer conveyor for carrying in a substrate into at least one of the vacuum processing chambers, via a lock chamber of double lock chambers,

wherein said substrate is carried in from a cassette which is placed on a cassette table, said substrate being

processed in said at least one of said vacuum processing chambers,

wherein said transfer conveyor carries out said substrate, processed in said at least one of said vacuum processing chambers, via another lock chamber of said double load lock chambers,

 1. wherein said transfer conveyor includes a first conveyor, of a loader, that faces to a set of substrates disposed in the cassette and transfers said substrates one by one to the lock chamber, and a second conveyor that is disposed in a conveyor chamber of a vacuum loader, and

wherein said first conveyor in said loader returns the substrates from said another of the double lock chambers to their original positions in said cassette in which said substrates are stored prior to processing thereof, surfaces of the substrates which have been processed being kept horizontal when the first conveyor returns the substrates.


44. The apparatus according to claim 43, wherein the substrate is carried directly from the cassette on the cassette table, into said one of the lock chambers, and said first conveyor carries the substrate directly from the another lock chamber to the cassette.

45. An apparatus for vacuum processing a substrate by using plural vacuum processing chambers, comprising:

a transfer conveyor for carrying in said substrate, disposed in an atmosphere different from an atmosphere in one



of said plural vacuum processing chambers, into said one of the plural vacuum processing chambers, via one lock chamber selected from double lock chambers, wherein the substrate is carried in from a cassette which is placed on a cassette table, to the one of the plural vacuum processing chambers processing the substrate; and



said transfer conveyor carrying out the substrate, processed in the one of the plural vacuum processing chambers, into said atmosphere different from said atmosphere in the one of the plural vacuum processing chambers, via another lock chamber of the double lock chambers,

wherein the transfer conveyor includes a first conveyor, in a loader, that faces to a set of substrates disposed in the cassette and transfers the substrates one by one to the one lock chamber, and a second conveyor is disposed in a conveyor chamber of a vacuum loader so as to make a rotative movement and a horizontal movement of X and Y axes, and

said first conveyor in said loader returns said substrates from said another double lock chamber to their original positions in the cassette in which said substrates are stored prior to processing thereof, surfaces of the substrates which have been processed being kept horizontal when the first conveyor returns the substrates.

46. The apparatus according to claim 45, wherein the substrate is carried directly from the cassette on the cassette table, into said one lock chamber.--

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